

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION DIRECTIVE MEMORANDUM

GENERAL SUBJECT:	<u>CONTROL OF CONTRACT EXPENDITURES</u>	NUMBER:	<u>CD-2003-2</u>
SPECIFIC SUBJECT:	<u>WORK ORDERS, FORCE ACCOUNTS, OVERRUNS, CONTRACT EXPENDITURES</u>	DATE:	<u>May 29, 2003</u>
		SUPERSEDES:	<u>CD-97-15</u>
		SUNSET/ EXPIRES:	<u>July 1, 2008</u>

Original w/Signature on file in the Office of
Construction Management

DANIEL R. LISTON
STATE CONSTRUCTION ENGINEER

DIRECTED TO – DISTRICT ADMINISTRATORS

Fiscal management and accountability is a principle concern in the administration of construction and maintenance contracts. A budget, including amounts for contract expenditures and construction engineering costs, is established for each contract. Strict fiscal management is imperative to ensure that contract expenditures and construction engineering costs do not exceed the established budget. It is essential that the appropriate procedures to manage costs are in place in the Department and all personnel associated with contract administration comply with these. These personnel include Inspectors, Project Engineers, Assistant Resident Engineers, Resident Engineers, District Contract Managers, District Construction Engineers, District Maintenance Engineers, District Administrators, and Assistant Construction Engineers as well as others. To ensure good fiscal management and accountability, all construction and maintenance contracts that are advertised, awarded, and executed through the Scheduling and Contract Development Division and incorporate the Road and Bridge Specifications are to be administered in accordance with this Directive. By doing this, we will be better able to meet our goal of managing our projects within the contract budget amount.

Procedures for work performed by work order or force account are addressed in this memorandum. In addition, expenditures on overruns of original contract items must be monitored and controlled. On all contracts, the expectation is to complete the contract work within the established budget. When it appears that the budget may be exceeded, prior approval must be obtained from Central Office management as outlined herein. Contracts have a contingency amount in their budget in addition to the awarded contract amount. The contingency amount is established to cover “**All Construction Cost Overruns**” resulting from work orders, force accounts and overruns of contract items; however, this does not mean you do not have to monitor and control the cost of work performed within the overall contract plus contingency amount. The contingency amount (which has traditionally been 10% of the contract amount) will be established at amounts appropriate for the risk of contract cost overruns. In addition, construction engineering budgets may be established at amounts other than the 8%, 12%, or 15% currently used. The total contract expenditures and construction engineering cost budget for each contract will be shown on the Fund Distribution sheet, the award letter to the District Administrator, and in the Construction Expenditure Report System.

The following procedures should be used to monitor and control costs:

1. Work that involves increased costs must be limited to only include work needed to provide a safe and fully functional facility as shown in the plans and contract documents.
2. At least monthly during the time the contract is active, the Engineer responsible for the contract (generally the Resident Engineer) is to make a projection of the total costs of contract expenditures (Work orders, force accounts, price adjustment, quantity overrun, and all other items constituting final contract construction cost are to be included in the projection). In addition, a projection of the total construction engineering costs must be made. Each District is to enter these projections in the Construction Expenditures Report System.
3. If the contract's budget for contract expenditures and construction engineering costs will be exceeded, the Engineer responsible for the contract must document the reasons for this in the Notes section of the Construction Expenditures Report System. The District Administrator and/or the District Construction Engineer should review the status of contracts in their District monthly.
4. If a Federal-aid full oversight project on the NHS has an original estimated cost (As shown on the approved Engineer's Estimate of contract expenditures, excluding any contingency amount, plus construction engineering costs) of more than \$10 million, the FHWA will be notified when the actual contract expenditures plus construction engineering costs exceeds the approved amount by more than 125%. The Scheduling and Contract Development Division will notify the Construction Management Division of each project that has an approved estimated cost greater than \$10 million at the time they receive approval of the estimate from FHWA. The Construction Management Division will be responsible for notifying the FHWA when this approved cost is exceeded.

FUNDING PROCEDURES

The District Administrator is responsible for ensuring that the Engineer responsible for the contract verifies that additional funding is available and allocated when the projected costs for contract expenditures plus construction engineering costs will exceed the amount budgeted for these items. The District Administrator must identify the projects from which additional funds will be taken. (Use Form PD-1, Request to Adjust Ad Date/Project Estimate Cost). The identification of funds must be done within the following guidelines:

On Secondary System projects, funding is to come from the same County's Secondary Budget.

On Primary System projects, funding can come from any other Primary project in that District.

On Interstate System projects, funding can come from any other Interstate project statewide.

On all systems, the additional funding must be identified and moved from the same Fiscal Year's funding on the project it is being moved from.

Once the budget for contract expenditures and construction engineering costs is projected to overrun, all work orders and force accounts that will result in additional expenditures will have to be approved in advance for funding by the Programming Division. Upon approval, the Programming Division will notify the District Administrator and the Financial Planning & Debt Management Division's cash forecasting section of their approval of the funding changes as well as the impact to the project from which funds are being taken.

Additional funding requests for maintenance contracts are to be made to the District Maintenance Engineer. They will be responsible for ensuring that the funds are available within their Maintenance budget, that the expenditures will be within any spending plans or limits in place at that time, and to actually approve the expenditure of additional funds.

As state funds are expended on federal-aid projects, it is essential that the state be promptly reimbursed by FHWA for their federal share. Reimbursement to the state for eligible expenditures on projects is limited to the federal funds as set forth in the **Federal-Aid Project Agreement**.

The federal funds provided for in the Agreement are determined from the Detailed Estimate Based on Contract Prices, following contract award. When it is determined that project cost overruns will result in the federal share exceeding the federal funds provided in the Agreement, it is necessary that the Agreement be modified to provide the additional federal funds required.

The Programming Division will determine if a Project Agreement will require modification. In order to make this determination, projections of the total construction cost shown in the Construction Expenditure Report System will be used.

Occasionally it becomes necessary to perform extra contract work that will be paid for in part or entirely from sources other than State or Federal-aid project funds. Generally, the other sources of funding will be municipalities, utilities, or property owners. In order to ensure that other participating parties are billed properly by the Fiscal Division for their share of the cost; the source and amount of funding participation must be clearly identified. Therefore, when extra work is necessary and is to be paid from other than State or Federal-aid project funds, the source and percent of participation are to be clearly shown on the work order.

APPROVAL AUTHORITY

Approval authority is delegated as follows for all work orders, unilateral work orders, and force accounts, including any associated time extension:

- | | | |
|---------------------------|---|--|
| 1. Resident Engineer | - | Up to \$100,000 on any system
Up to \$200,000 on Secondary system |
| 2. District Administrator | - | Up to \$750,000 on any system |

If a work order is solely for a time extension on either a fixed date or calendar day contract, the District Administrator may approve the work order. If a work order is solely for a time extension on a calendar day contract, the Resident Engineer may approve the work order. The State Construction Engineer may temporarily revoke this delegated approval authority if this policy is not followed.

The Chief Engineer of Operations must approve any work order or force account over \$750,000 after it has been reviewed and recommended for approval by the State Construction Engineer or his designee.

In approving work orders, unilateral work orders, and force accounts, each level of authority needs to remember that the process is establishing a new contract and with such goes a responsibility to ensure the work is necessary and that the cost is reasonable. Resident Engineers and District Administrators may delegate their signature authority; however, the accountability for compliance with this policy remains with the Resident Engineer and District Administrator. Delegation of authority to sign work orders and force accounts must be documented in writing. District Administrators cannot delegate any additional level of approval authority to Resident Engineers beyond the authority levels previously outlined.

The approving authority is responsible for insuring that the added work is within the scope and geographic area of the initially contracted work prior to formulation or processing.

For construction and maintenance projects, except maintenance schedules, geographic area is defined as the area within the limits of the project as outlined in the contract documents. For maintenance schedules, such as plant mix, surface treatment, slurry seal, etc., geographic area is defined as the County(s), City(s), or Town(s) within which the initial contract work is located. Routes defined in maintenance schedules may be altered or deleted and routes may be added within the geographic area. Scope is defined as work similar in nature to that specified in the contract documents and necessary for the facility to function as intended in the original documents. Questions regarding scope of work or geographic area on projects are to be discussed with the State Construction Engineer or appropriate Assistant prior to any action being taken to add work.

GENERAL PROCEDURES

The Resident Engineer is to notify the Contractor of extra work to be performed after the aforementioned criteria of scope, geographic area and funding have been confirmed. The Contractor is to be provided plans or other available data, which describes the work to be accomplished. The Resident Engineer should request the Contractor to provide unit prices for the proposed work along with an itemized cost breakdown of the unit prices based on the labor, equipment, and material to be used and the production rates used in deriving the unit prices and any requested contract time extension. Since unit prices on work orders are not established by competitive bidding, all proposed unit prices must be analyzed to ensure that they are reasonable. In addition, if the Contractor requests a time extension, the proposed time extension must be analyzed to ensure that it is reasonable.

The Department's analysis of the Contractor's itemized cost breakdown should include confirmation that the production rate is reasonable, that equipment rates are not above Blue Book rates calculated as outlined in Section 109.05 of the Specifications, that materials costs are justified, and that labor rates correspond to wages currently paid by the Contractor. Allowances and markups shown on the itemized cost breakdown of labor, equipment, and material should not exceed those specified in Section 109.05. Extension of time for the work detailed in the work order will only be considered if the work involves a controlling work item or is on the critical path for project completion. The amount of time extension granted should be based upon an analysis of the time it should take to perform the work, preferably based on the appropriate production rates of the items in question.

If the Contractor does not provide an itemized cost breakdown, the Resident Engineer can either develop his own itemized cost breakdown estimate to compare to the Contractor's proposed unit price(s) or compare the unit price(s) on the proposed items to unit prices paid for the same items on other contracts. In addition, the Scheduling and Contract Development Division's Estimating Section may be contacted for assistance with the analysis of whether unit prices are reasonable. The Resident Engineer's and/or the Estimating Section's conclusions, including the exact reasons why unit prices were judged reasonable or unreasonable, should be documented in writing and presented as support for further processing of the work order.

Please refer to the attached "Options for VDOT Cost Analysis" for flowcharted guidelines on analyzing proposed work order unit prices. These guidelines are applicable for all contracts; however, on contracts that have FHWA full oversight it is essential to closely follow these guidelines. Also attached are "Work Order Price Analysis" documents for your use. These give examples of acceptable documentation for price analysis done either by unit price comparison or by analysis of an itemized cost breakdown of labor, equipment, and material.

When prices are determined to be unreasonable, the Resident Engineer should attempt to obtain further justification from the Contractor for the prices and/or to negotiate with the Contractor to change the prices. All attempts to obtain further justification and/or to negotiate, including verbal attempts, are to be documented by letter to the Contractor. The extent of the Department's cost analysis needs to be documented and submitted as part of the justification for the work order. Unit prices can be set by the Department and a unilateral work order can be processed if negotiations are unsuccessful. If the exact extent of the extra work is not known or if agreement cannot be reached on unit prices, then the Contractor may be directed to perform extra work on a force account basis in accordance with Section 109.05 of the Specifications. If the Contractor requests to negotiate original contract item unit prices, as allowed for in Section 104.02 of the Specifications, the Contractor will have to justify and document the reasons for any unit price increases. This justification should be analyzed and the Department's reasons for the decision on the unit price must be documented.

The Resident Engineer is responsible for informing the Federal Highway Administration (FHWA) of impending changes in contract work on FHWA full oversight projects. Also, the Resident Engineer must ensure compliance with the terms of any third party construction agreements. FHWA approval of full oversight project contract changes, including work orders and force accounts, will follow a two-step process:

First, the FHWA needs to be notified of the need for the change as soon as possible so that a verbal approval can be obtained for the contract change and permission granted to perform any extra work.

Second, FHWA approval of unit prices and time extensions will be based upon their analysis of the Department's cost analysis and justification for any time extensions. When the Department's cost analysis and time extension justification is complete, this information should be forwarded to FHWA to obtain approval of the entire contract change before the actual contract change documents are forwarded to the FHWA for signature. It is critical that the Department supply a cost analysis and/or time extension justification as part of the documentation forwarded to FHWA. Any work orders without this justification documentation will be returned as Federal-aid nonparticipating. It will be the Resident Engineer's responsibility to ensure that any limits placed on contract changes by FHWA be followed and properly documented. The transmittal to the State Construction Engineer should document that FHWA contact was made and should include the dates, persons, and FHWA responses.

If the proposed unit prices are acceptable, a work order (Form C-10) should be prepared. Any contract items being deleted or reduced as a result of the changes are to be shown as decreases and new items shown as increases. Funding sources and respective percents of participation are to be clearly noted on the work order. If the work order, force account, or contract overrun is due to a plan discrepancy, the Resident Engineer is to make an estimation of the dollar amount associated with the plan discrepancy. The Resident Engineer should consult with the District Design Engineer or Bridge Design Engineer and document the findings by memorandum. Consultant design errors and their associated cost should be noted in the transmittals, but never on the work order. After the work order has been signed by the Contractor and returned to the Resident Engineer, the following action(s) are to be taken for approval.

Please refer to the attached "Extra Work Process Flow" for a flowchart outlining this process.

RESIDENT ENGINEER

The Resident Engineer may approve the work order or unilateral work order, on Form C-10, with a net total increase or decrease up to \$100,000 on any road system and up to \$200,000 on the Secondary system once a cost analysis validates the Contractor's unit prices and confirmation of the Contractor's proposed time extension is made. Verbal approval of a work order or unilateral work order may be given to the Contractor immediately upon approval. Note that "verbal approval" is defined as a verbal direction from that individual who will be approving the work order for the Department on Form C-10. The date is to be noted and Contractor's representative who was notified is to be documented on Form C-10. The Project Inspector is to be informed that the Contractor has been notified if the notification is not relayed through them. A copy of the signed Form C-10 is transmitted to the Contractor either to authorize them to proceed with the work, or to confirm the relayed verbal authorization. When confirming authorization to proceed with work, the transmittal needs to state to whom verbal notification was given. The transmittal of the original work order or unilateral work order and copies of the signed "Approved" work order are distributed as follows:

- | | |
|--------------------------------|---|
| State Construction Engineer - | Original and three copies of C-10 (do not send copy of documentation) is to be sent on work orders and unilateral work orders not requiring FHWA approval. On projects requiring FHWA approval, send original C-10 and two copies of the C-10 with copies of support documentation, including Department's cost analysis, attached to the copied C-10. State Construction Engineer is to receive all original work orders (once approved) to be retained in Central Office. |
| District Administrator - | Two copies of Form C-10 and documentation. |
| Project Engineer - | One copy of Form C-10 and documentation. |
| Residency File - | One copy of Form C-10 and documentation. |
| Project Manager/ -
Designer | One copy of Form C-10 and documentation if work order resulted from a plan discrepancy |

Asst. State Construction - One copy of form C-10 and documentation **if work**
Engineer **order resulted from a plan discrepancy**

NOTE: Documentation to include a separate memorandum with recommended consultant's cost responsibility, when applicable.

For work orders and unilateral work orders not under the approval authority of the Resident Engineer, the Resident Engineer will sign Form C-10 recommending approval and transmit to the District Administrator (original C-10 and two copies of Form C-10 and two copies of supporting documentation including Department's cost analysis).

The Resident Engineer will be responsible for contacting the VDOT Project Manager/designer by telephone or email requesting their input, if necessary. The Resident Engineer will document the input received by the Project Manager/designer and forward that information as part of the work order submission. **On Federal oversight projects, FHWA will not approve any work order unless documentation of the Resident Engineer – Project Manager/designer contact is provided.** For work orders in which there is agreement that the work order is the result of a plan discrepancy, the Resident Engineer will forward a memorandum detailing the problem to the VDOT Project Manager/designer and Assistant State Construction Engineer for further analysis and appropriate disposition. The memorandum should include a copy of the work order and note whether the design was performed in-house or by consultant.

When additional work is to be accomplished and paid for on a force account basis, if the contract is on a FHWA full oversight project, the FHWA must be contacted and must approve doing the work by force account prior to the Department entering into a force account agreement with the Contractor. The actual force account agreement must also be sent to the FHWA for their approval. In addition, on all contracts the labor and equipment to be paid for each day as well as their expected production rates should be agreed to in advance with the Contractor to ensure they are reasonable. Time extensions resulting from a force account should be granted only if the force account affects the critical path of the contract and/or is a controlling item of work. The time extension should be limited to only the amount of time that the force account impacts the overall work on the contract's critical path.

The Resident Engineer will be responsible for the forwarding of copies of all notice-of-intent (NOI) to file a claim by Contractors to the FHWA on all full-oversight projects. The FHWA will be kept informed of the status of the NOI and allowed an opportunity to provide input during the processing of the NOI.

The following statement is to be used on all work orders that settle notice of claim intent. It can also be used on any other work order (optional) if mutually agreed upon by the Contractor and the Department (to be discussed with Assistant State Construction Engineer):

"Contractor's (Name) and VDOT agree that this work order fully resolves and settles all claims, demands or damages of any kind relating to or arising out of the work set forth in this work order, including but not limited to delay, impact and acceleration."

The District Administrator should determine if additional copies of Form C-10 and supporting documentation are needed for third party distribution. The transmittal is to include information regarding funding, scope and geographic area, FHWA notification date and position, and supporting documentation.

For work orders recommended by the Resident Engineer, the District is to notify the Residency upon approval of the work order. The Residency then notifies the Contractor to proceed with the work and furnishes a copy of the C-10 and documentation to the Project Inspector; also, copies of the work order are to be retained by the Residency.

Copies of the approved work order are to be furnished to the District Materials Engineer and other sections, as applicable. A copy of the work order and original documentation is to be retained by the District on **all work orders**.

DISTRICT ADMINISTRATOR

Work orders, unilateral work orders, or force accounts that are recommended by the Residency are to be reviewed for compliance by the District Administrator. The transmittal should include all supporting documentation. The District Administrator will review the Department's cost analysis and time extension justification for acceptability. The District Administrator can approve work orders, along with associated time extensions, up to \$750,000 on any road system and authorize the work to be performed. Availability of funding must be verified and the FHWA contacted, when applicable, in the same manner as previously noted. Upon approval of a work order, unilateral work order, or force account by the District Administrator, the Resident Engineer is informed to notify the Contractor to proceed with work. A record is to be kept of the date and to whom the notification is relayed.

Work orders, unilateral work orders, or force accounts over \$750,000 on any system that are recommended for approval are to be sent to the Construction Management Division. The Construction Management Division, upon approval of the work order, provides approval notice along with a transmittal letter and copies of the signed work order. The District informs the Resident Engineer to notify the Contractor that they may proceed with the work.

"Approved" work orders are to be distributed as follows:

State Construction Engineer - Original and three copies of C-10 (do not send copy of documentation) is to be sent on work orders not requiring FHWA concurrence. On those requiring FHWA concurrence, send original C-10 and two copies of the C-10 with copies of documentation attached to the copied C-10 including Contractor's breakdown. State Construction Engineer is to receive all original work orders once approved to be retained in Central Office.

Project Inspector - One copy of Form C-10 and documentation.

Residency File - One copy of Form C-10 and documentation.

STATE CONSTRUCTION ENGINEER

For work orders, unilateral work orders, and force accounts recommended by the Residency and District that exceed \$750,000, the State Construction Engineer (or designee) will review the Department's cost analysis for acceptability and the justification for any associated time extension. If found in order, the State Construction Engineer will recommend approval of work orders, unilateral work orders, and force accounts greater than \$750,000 to the Chief Engineer of Operations.

If FHWA concurrence is required, the State Construction Engineer is to send the FHWA the original work order and one copy of the C-10 with justification documentation, including the Department's cost analysis for FHWA approval (retain one copy of C-10 and documentation until original is received back from FHWA).

All work orders processed by the Construction Management Division are logged in a tracking system as each time event occurs. The date(s) received, approved, forwarded to FHWA, approved by FHWA, approval notice given to District, and transmittal date of work orders are recorded. The FHWA is to be notified of any document that has not been processed by FHWA within 2 weeks of forwarding to FHWA. Once the work order is approved by the FHWA, a transmittal with copies of the signed work order is sent to the District for distribution. A copy of the transmittal and the work order is retained and the original work order with documentation is sent to the Central Office Contract File.

CHIEF ENGINEER OF OPERATIONS

Work orders, unilateral work orders, or force accounts exceeding \$750,000 are to be recommended for approval by the State Construction Engineer, or designee, and forwarded to the Chief Engineer of Operations. The Chief Engineer of Operations is furnished the original work order, unilateral work order, or force account and documentation, including the Department cost analysis and justification for any associated time extension. Upon approval, the State Construction Engineer has the work order, unilateral work order or force account transmitted as previously outlined.

SUMMARY

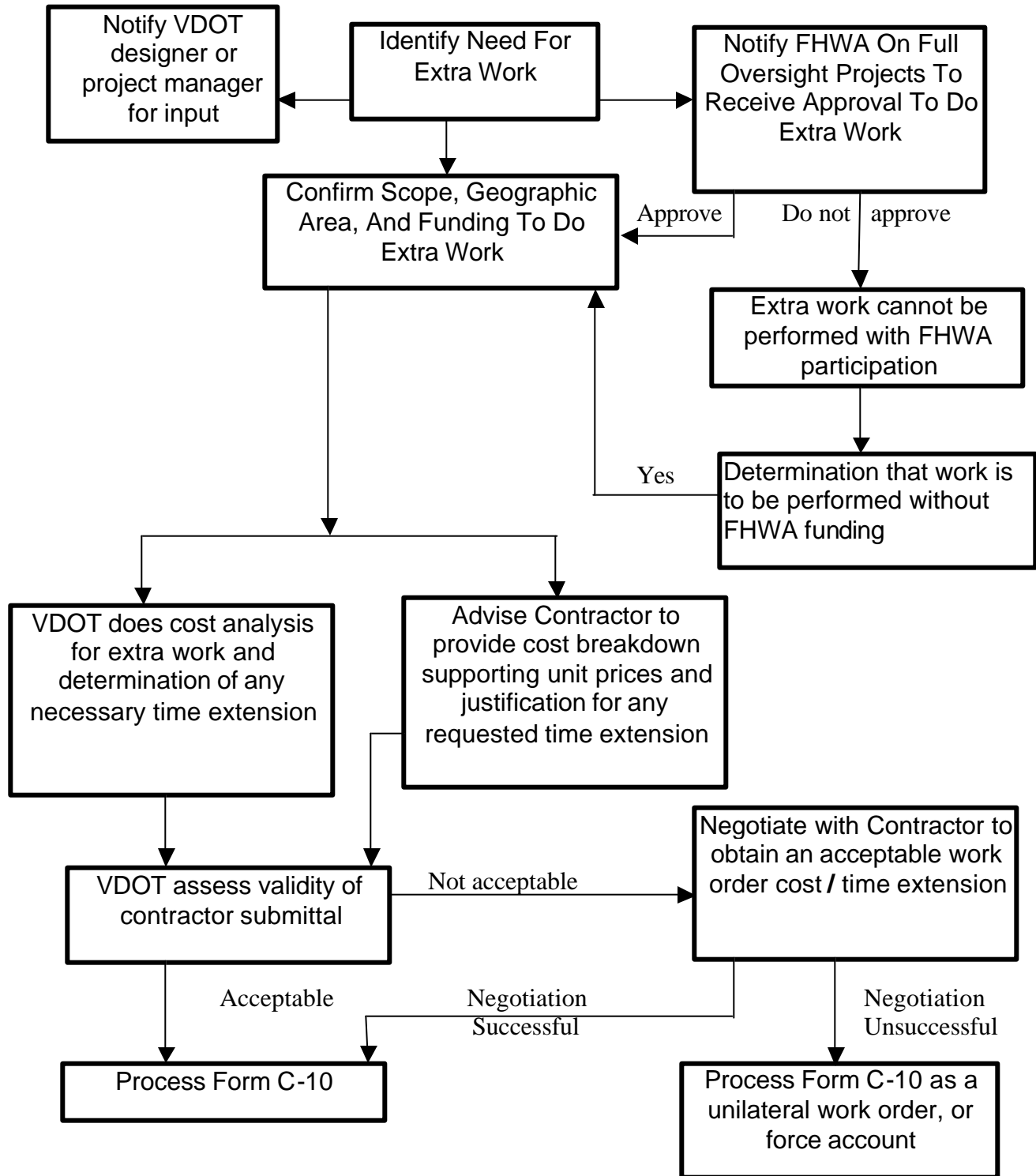
While minimizing or eliminating cost overruns and delays in completing contracts is one of the most important aspects of managing Department construction and maintenance projects, this should not be the primary factor in determining whether additional work is needed. Changes that will result in increased costs and/or delays will occur. It is up to us to minimize the impacts of these changes. Decisions should be made and actions taken as soon as possible to minimize both the financial costs and time delays that changes may bring. Project Engineers and Inspectors must keep abreast of all phases of the work and recognize items not included in the original contract as well as changed conditions that may result in negotiated prices on original contract items. Any changes determined to be necessary in proposed contract work are to be made and paid for in accordance with Section 104.02 of the Specifications.

These procedures are applicable for all construction and maintenance contracts that are advertised, awarded, and executed through the Scheduling and Contract Development Division and incorporate the Road and Bridge Specifications. They must be followed unless otherwise specifically directed by the State Construction Engineer.

The authority to initiate and approve work orders and force account work comes with the responsibility to follow these procedures. Each person involved must carefully evaluate the need for the work, acceptability of unit prices and time extensions, availability of funds, and conformance to this policy.

C: Mr. Philip A. Shucet
Mr. Claude D. Garver, Jr.
Commissioners Staff
Division Administrators
District Construction Engineers
District Maintenance Engineers
District Materials Engineers
District Equal Opportunity Managers
District Contract Administrators
Resident Engineers
Project Engineers
Project Inspectors
Federal Highway Administration
Virginia Department of Minority Business Enterprise
Virginia Road and Transportation Builders Association
Old Dominion Highway Contractors Association
Virginia Asphalt Association
Virginia Aggregates Association Inc.
American Concrete Pavement Association
Virginia Ready-Mixed Concrete Association
Precast Concrete Association of Virginia

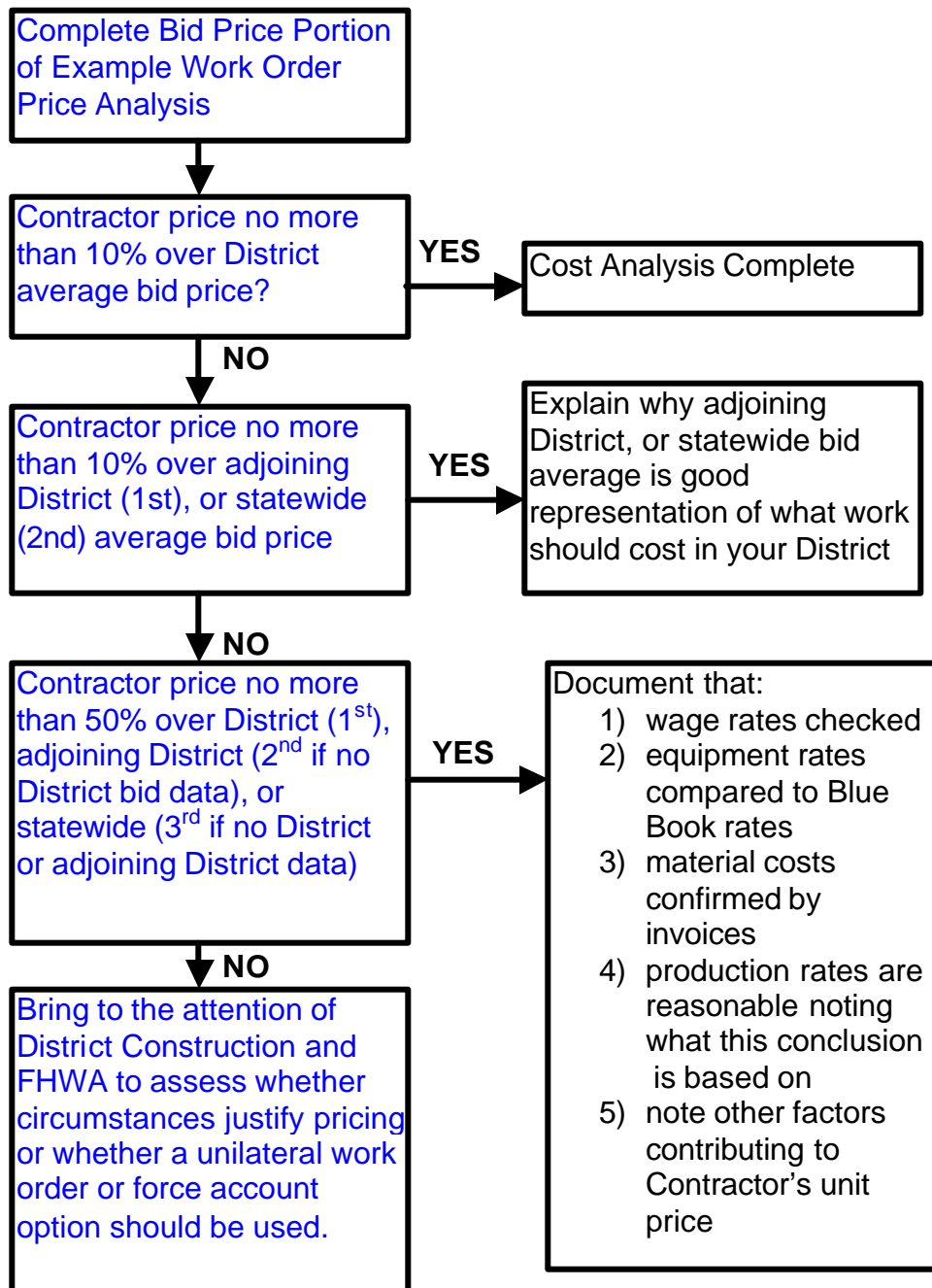
Extra Work Process Flow



OPTIONS FOR VDOT COST ANALYSIS

VDOT **must** do a cost analysis for each work order. **The extent of the cost analysis must be concurred with by FHWA on all full Federal oversight projects.** Depending upon the items involved in the cost analysis, the extent of the analysis can vary from a review of District bid prices for items in which the District has an extensive bid history to a complete independent cost analysis in which VDOT personnel estimate the extra work based upon information from suppliers and estimation of quantities and production rates on items without an extensive bid history or on specialty items. The following levels of cost analysis should be performed:

FOR COMPARABLE TYPE ITEMS AND QUANTITIES



WORK ORDER PRICE ANALYSIS

Performed by _____

Contract ID: _____

Work Order No.: _____

State Project No.: _____ FHWA No.: _____

ITEMS	LOW BID PRICE* incl. quantity (District _____) or Statewide	AVERAGE BID PRICE incl. quantity (District _____) or Statewide	HIGH BID PRICE* incl. quantity (District _____) or Statewide	Contractor Price	Work Order Quantity

* optional

EXPLANATION:

Example of VDOT work order cost analysis in which good District bid history of comparable quantities is available:

WORK ORDER PRICE ANALYSIS

Performed by Sam Jones

Contract ID: 245-97B

Work Order No.: 2

VDOT No.: 0099-095-F14, C504

FHWA No.: IM-NH-099-1(233)

ITEMS	LOW BID PRICE* incl. quantity (District _West_) or Statewide	AVERAGE BID PRICE incl. quantity (District _West_) or Statewide	HIGH BID PRICE* incl. quantity (District _West_) or Statewide	Contractor Price	Work Order Quantity
End Section, ES-1 12"	\$277.36@ 6	\$335.89 @ 3	\$375.25 @ 1	\$334.34	3 EA
Storm Water Manage- ment SWM-1 ¹	<u>\$438.50@</u> <u>2500</u>	\$519.92@ 1200	\$570.16@1000	\$685.00	100 FT
Dry Riprap CL 1 (Rock Weir)	\$33.11@ 4000	\$38.05@ 1500	\$44.81@ 750	\$40.20	1000 TON
48" concrete pipe ²	\$250.00@ 475	N/A	N/A	\$334.00	450 LF
Aggregate Type A1 (Rock Weir)	\$34.32@ 300	\$46.77@150	\$50.52@25	\$49.43	100 TON

* optional

EXPLANATION:

Prices were negotiated twice prior to approval of the Residency. Price ranges for items were developed from District bid histories for similar type projects of comparable quantities except for Item "Storm Water Management SWM-1" where comparable quantities were not found. These prices were obtained from the Construction Division.

¹ All prices were within the District ranges except for Item "Storm Water Management SWM-1" where the Contractor's price was 20% above the "High Price" and 32% above the "Average Price". Contractor's itemized cost breakdown was reviewed for production rate, equipment rates and labor wage rates and found to be acceptable due to low quantities.

² Bid history does not justify Contractor's proposed price, see VDOT cost analysis below.

Above Price Analysis Form based upon the work of Mr. Marty Halloway, Bristol District

Example of VDOT work order cost analysis in which bid history is not available or when bid history does not justify Contractor's:

Project: 0099-095-F14, C504
FHWA No.: IM-NH-099-1(233)

Work Order No. 2

Unit Price Verification for 48" Concrete Pipe (51' cover)

Please find attached and listed below information verifying the Contractor's total unit price of \$334.00 per L.F. for 48" concrete pipe with 51 feet of cover and specifically the \$268.77 per L.F. material costs.

A. Material Costs

Xpress Concrete Products Inc. invoice quote to Xpress Contractors attached
48" X 8' Special Design Concrete Pipe @ \$235.00 per L.F.
48" X 8' Special Design Concrete Bends @ \$2650.00 or \$331.25 per L.F. (45 deg. & 30 deg.) for 51' cover

B. Additional Projected Costs included in Contractor's Material Costs

Mastic - \$0.35 per Lb./58 lbs. per joint or \$20.30 per joint divided by 8' (pipe section) = \$2.53 per L.F. of pipe
Pipe Breakage Allowance (assume 3%) - \$268.77 X 3% = \$8.06 per L.F.
Sales tax - \$235.00 X 4.5% = \$10.58 per L.F. (Bends \$331.25 X 4.5% = \$14.91 per L.F.) (744 total feet of 8' sections and 16' of bends weighted average = \$10.67.)

C. Material Summation

Price from invoice quote	\$237.02	Pipe (weighted average of pipe and bends)
	\$2.53	Mastic
	\$8.06	Breakage Allowance
	<u>\$10.67</u>	Sales Tax
TOTAL	\$258.28	per L.F. Materials Cost versus Contractor's \$268.77

D. Other Considerations to be included in Material Cost of 48" pipe to explain \$10.49 per L.F. difference between VDOT cost analysis and Contractor's price:

VDOT cost analysis does not include:

1. Core drill for 48" pipe to receive 8" outlet pipe from spring boxes
2. Repair of lifting holes
3. Cost of transporting pipe to pipe trench and access to 48" pipe location (not included in equipment and labor costs)
4. Allowance for 15% material markup (= \$38.74)

Thus, estimated material costs = \$297.02(+) > \$268.77

E. Equipment costs

HYD. EXAV., C245, 3CY, 325 HP, C.M. @ \$130.27/HR X 8 HR/DAY =	\$1,042.16/DAY
Walk-behind tamper, wacker W74 @ \$6.73/HR X 8 HR/DAY =	\$53.84/DAY
Vib. roller, 46" drum, 32 HP @ \$11.86/HR X 8 HR/DAY =	\$94.88/DAY
Misc. hand tools @ \$11.00/HR X 8 HR/DAY =	\$88.00/DAY
Truck, tandem dump, 12T LD. @ \$36.94/HR =	\$295.52/DAY
Pickup, 4 X 2, ¾ TON, 130 HP @ \$5.01/HR =	<u>\$80.16/DAY</u>
TOTAL	\$1,654.56/DAY

Assuming production rate of 104 L.F per day = \$15.91/L.F
TOTAL \$15.91/L.F.

F. Labor Costs

Excav. & loader operator @ \$11.53/HR X 8 HR/DAY =	\$92.24/DAY
Foreman @ \$15.00/HR X 8 HR/DAY =	\$120.00/DAY
3 laborers @ \$8.12/HR X 8 HR/DAY =	\$194.88/DAY
Pipelayer @ \$9.05/HR X 8 HR/DAY =	\$72.40/DAY
Roller operator (rough) @ \$9.31/HR X 8 HR/DAY =	\$74.48/DAY
Truck driver, mu, rear axle @ \$9.44/HR X 8 HR/DAY =	<u>\$151.04/DAY</u>
TOTAL	\$705.04/DAY

Assuming production rate of 104 L.F. per day = \$6.78/L.F.
Overhead = 50% (\$3.39)

TOTAL \$10.17/L.F.

G. TOTAL

\$294.70/L.F.	Materials
\$15.91/L.F.	Equipment
<u>\$10.17/L.F.</u>	Labor
\$320.78/L.F.	
<u>\$32.08/L.F.</u>	10% Markup
\$352.86/L.F.	TOTAL > \$334.00/L.F Contractor's work order unit price OK